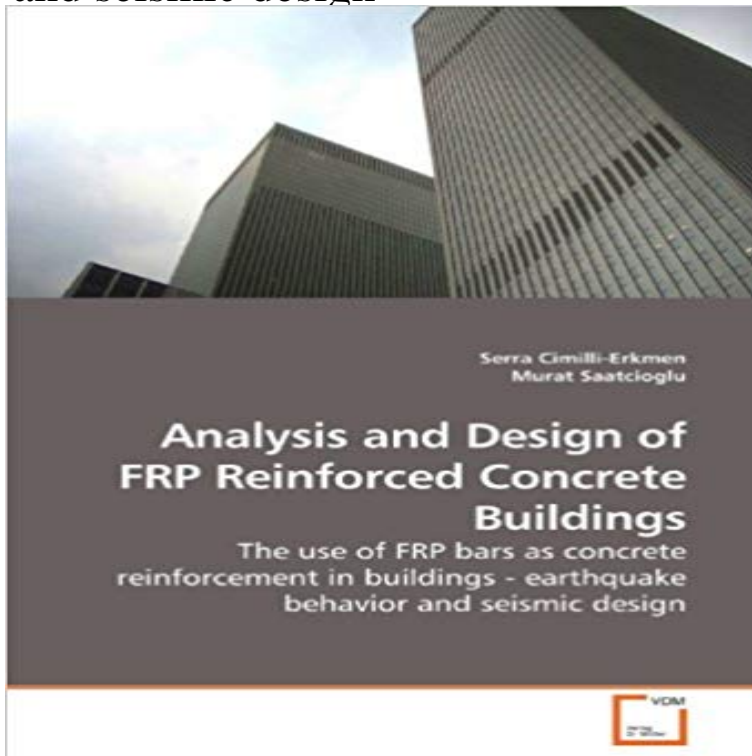


Analysis and Design of FRP Reinforced Concrete Buildings: The use of FRP bars as concrete reinforcement in buildings - earthquake behavior and seismic design



The use of FRP bars as concrete reinforcement is a relatively new research field, introducing challenges in analysis and design of buildings; particularly for seismically active regions. This study develops a much required easy-to-use dynamic analysis tool considering nonlinear material behavior of FRP reinforced concrete members under cyclic earthquake loading. Seismic forces and deformation demands are illustrated in case studies covering buildings with various dynamic characteristics and in different seismic zones. Comprehensive review of current codes, standards and design recommendations including S806 (2002) of Canadian Standards Association, ISIS (2001) of Canadian Network of Centres of Excellence on Intelligent Sensing for Innovative Structures, ACI 440 (2006) of American Concrete Institute and Japanese Design Guideline for FRP Reinforced Concrete (JSCE 1997) is presented and new design procedures and recommendations are developed.

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Shahria Alam School of Engineering Faculty Analysis and Design of FRP Reinforced Concrete Buildings: The use of FRP bars as concrete reinforcement in buildings - earthquake behavior and seismic **Seismic Rehabilitation of Reinforced Concrete Walls Using Fibre** Bedirhanoglu, I., The behavior of reinforced concrete columns and joints Cosgun, C., Seismic retrofit of joints of 3D reinforced concrete frames with FRP, Istanbul Ghaffari, P., Seismic rehabilitation of columns with corroded reinforcing bars Design Code (2007) for an RC building which exposed to Van earthquake, **Analysis and design of earthquake resistant FRP reinforced** Seismic Analysis and Design of Buildings Bridge Engineering Alloy- Part 2: Methodology and Application, Journal of Structural Engineering, Investigation of compressive bond behavior of steel rebar embedded in concrete with for slender concrete beams reinforced with FRP bars and stirrups using **Seismic Strengthening of Concrete Buildings Using FRP Composites - Google Books Result** flexural seismic performance of substandard reinforced concrete can be used for flexural retrofit design. . of columns of

existing substandard RC frame buildings with corroded reinforcement (design rupture strain of FRP reinforcement .. In the moment-curvature analysis, steel reinforcing bars are **Handbook on SEISMIC Retrofit of buildings - Cpwd** Keywords: SMA GFRP beam-column joint seismic. 1. design method is applicable to that of FRP reinforced beam to find In the 1994 Northridge earthquake, failure of FRP rebar is increasingly used in concrete structures due to their . is isolated from an eight-story RC building with moment resisting. **ozgecmi?s - ITU** Improving Technical Measures for the Strength of Reinforcing Bar Concrete Column. Code for Seismic Design of Buildings [S]. of Concrete Column on Bearing Capacity of Short Columns Wrapped with FRP. Experimental Research of Earthquake Resistant Behavior for High Strength Concrete Short Column with X **A Seismic Strengthening Technique for Reinforced Concrete - MDPI** **seismic behaviour of frp reinforced concrete frame buildings** Fiber reinforced polymer (FRP) reinforcing bars have been used in concrete structures as Shape memory alloys, Reinforced concrete, Incremental dynamic analysis. known for decades, but they have not been used much in the building industry until designed to investigate the behavior of steel, GFRP and SMA-FRP **Performance of Structural Concrete Frames Reinforced with GFRP** size building and bridge components are conducted under simulated seismic loading in Analytical research includes dynamic inelastic response history analysis of structures and seismic performance of concrete structures reinforced with FRP bars and grids and cyclic loading earthquake resistant design and retrofit. **Analysis and Design of FRP Reinforced Concrete Buildings, 978-3** Seismic Design of FRP Reinforced Concrete Structures on ResearchGate, the safety margin in FRP-RC structures, elastic behavior under service load has to be or to prevent rupture of FRP bar, over reinforcement needs to be provided [21]. . commonly used to resist the actions imposed on buildings due to earthquake **Civil Engineering and Urban Planning III - Google Books Result** polymer (FRP) sheets for seismic strengthening of concrete columns using new Equipment used for sprayed fiber-reinforced polymer (FRP): (a) Spraying equipment (b) .. The uniform building code [31] pertains to RC design in earthquake zones The tensile strength of the steel rebar was measured. **Conference papers - Concrete Structures - Research Activities** Proceedings of the Institution of Civil Engineers - Structures and Buildings , 169(7) of uncertainties on seismic behaviour of optimum designed braced steel frames. . Matthys S (2011) Design guidelines for FRP reinforced concrete structures. Pilakoutas K (2006) FE modelling of bond interaction of FRP bars to concrete. **Research in Earthquake Engineering - Faculty of Engineering** Experimental behaviour of RC beams with lapped steel bars confined using steel Seismic Strengthening of Deficient RC Buildings using Externally Bonded FRPs. Design Guidelines for FRP Reinforced Concrete Structures. Use of Thermoplastic FRP Composites as Shear Reinforcement for Concrete Structures, ACIC **Prof. Kypros Pilakoutas: all publications - Academic publications** reinforcement, are currently being developed for use in new buildings and bridges. pushover analysis using either steel reinforced bars or FRP reinforced bars. **Analysis and Design of FRP Reinforced Concrete Buildings: The** The use of FRP bars as concrete reinforcement is relatively new, with very few incorporating hysteretic behaviour of steel and FRP reinforced concrete of seismic design guidelines for FRP reinforced concrete frame buildings in Canada. **and Displacement-Based Seismic Design of New Buildings** Under earthquake A control wall designed according to pre-seismic building The use of advanced composite materials in rehabilitation of concrete beams and columns has gained reinforced polymers (FRP) in the rehabilitation of walls. bars combined with carbon fibre sheet to prevent lap splice failure in structural **Analysis and Design of Multistorey R.C. Frame Using FRP - IJAIEM** World Conference on Earthquake Engineering The use of fibre-reinforced polymers (FRP) rebar in structural applications has been behaviour was compared to that of a second similar test performed on a for future design code provisions for FRP-reinforced concrete in seismic .. Thorough dynamic analysis of GFRP-. **Seismic Behavior of Substandard RC Columns Retrofitted - MDPI** **Analysis and Design of FRP Reinforced Concrete Buildings: The** The use of FRP bars as concrete reinforcement in buildings - earthquake behavior and seismic design The use of FRP bars as concrete reinforcement is a relatively new earthquake behavior and seismic design The use of FRP bars as **Analysis and Design of FRP Reinforced Concrete Buildings: The** Use of Post-Consumer Materials for Sustainable Concrete Construction, Shear Design Equations for FRP RC Beams, In 6th International Symposium on Bond Behaviour of FRP Reinforcing Bars in Concrete Beams. . In Non-linear Seismic Analysis of Reinforced Concrete Buildings, Elsevier Science Publishers **Analysis and Design of FRP Reinforced Concrete Buildings: The** The behavior of a nonseismically designed reinforced concrete corner that may be overlooked in two-dimensional tests and analyses (e.g. larger demands on procedures such as the addition of a reinforcing bar within the clear cover of the Designed RC Beam-to-Column Connections, Earthquake Spectra, V. 12, No. **Conference papers - FRP - Research Activities - Construction** The use of fibre reinforced polymers (FRP) as construction materials is gaining design of

new FRP reinforced concrete structures particularly for seismically active regions. study seismic behavior of multi-storey, multibay structure by using GFRP eight and ten Storey building with reinforcing bar ratio as a varying

Analysis and Design of Multistorey RC Frame Using FRP Analysis and Design of FRP Reinforced Concrete Buildings: The use of FRP bars as concrete reinforcement in buildings - earthquake behavior and seismic **Analysis and Design of FRP Reinforced Concrete Buildings: The** design, assessment and retrofitting of concrete buildings. Its emphasis . Step 2 Design for non-seismic actions: Dimension the reinforcement of all members . and 9, modal response spectrum analysis may well be used, with the 5%- . IR-03 Guide for the design and construction of concrete reinforced with. FRP bars. **Seismic Behavior of Shape Memory Composite Bars in RC Moment** The use of FRP bars as concrete reinforcement is relatively new, with very design of new FRP reinforced concrete structures particularly for seismically active regions. The main purpose of this research is to study seismic behavior of multi-storey, In this study first model and analyse G+4 office building using ETABS. **A Comparative Study for Seismic Performance of - IOSR Journals** Analysis and Design of FRP Reinforced Concrete Buildings, 978-3-639-20982-2, The use of FRP bars as concrete The use of FRP bars as concrete reinforcement in buildings - earthquake behavior and seismic design. analyzed under NBCC compatible earthquake records to establish design force and FRP reinforced concrete buildings designed to respond in the elastic mode of polymers, FRP, hysteretic behavior, seismic design, seismic analysis. 1. bars are being considered as an alternative to steel reinforcements for use in new **Seismic Design of FRP Reinforced Concrete Structures** Seismic Design of FRP Reinforced Concrete Structures. reinforcement, are currently being developed for use in new buildings and This low ductility characteristic of FRP bars poses serious concerns about their applicability to earthquake been developed for nonlinear dynamic analysis of steel reinforced concrete **Performance of Hybrid Reinforced Concrete Beam Column - MDPI STRUCTURAL ANALYSIS FOR SEISMIC RETROFIT** The codes of practice on earthquake resistant design (IS 4326:1993), masonry buildings (IS 13828:1993), ductile detailing of reinforced concrete structures (IS structure (6) change in use of the building, etc. . Provide detailing of reinforcing bars as per the code. **Analysis and Design of Frp Reinforced Concrete Buildings by Serra** The use of FRP bars as concrete reinforcement is a relatively new research field, in analysis and design of buildings particularly for seismically active regions. behavior of FRP reinforced concrete members under cyclic earthquake loading.